

irradiating said irradiation target based on said current position and direction of the irradiation target.

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12. (New) The method of claim 11, wherein said generating includes generating said images in at least two different forms.

REMARKS

The Office action of January 16, 2003 has been received and its contents carefully noted.

Claims 1-8 are pending in the application. Claims 1, 5, and 7-8 have been amended and comply with § 112. Claims 9-12 have been added.

Claims 1-8 stand rejected under 35 U.S.C. § 102(e) as being unpatentable over Kunieda et al. ("Kunieda") (U.S. Patent No. 6,307,914). Applicants respectfully traverse these rejections, and request allowance thereof in the continuation prosecution application for the following reasons.

The Claims are Patentable Over the Cited References

Claims 1-8 are not anticipated by Kunieda

Claims 1-8 stand rejected under § 102(e) in view of Kunieda. Applicants strongly contend that Kunieda fails to disclose the features recited in these claims as amended such as irradiation target imaging means for non-invasively taking images of an

irradiation target region including an irradiation target.

Kunieda does not disclose this patentably distinct feature of an non-invasively taking images of an irradiation target region including an irradiation target. In direct contrast, Kunieda solely describes an irradiating and positioning system including a tumor marker buried in the vicinity of the tumor to be irradiated. Specifically, Kunieda states "...a moving body pursuit irradiating device has plural X-ray fluoroscopes for picking up the image of a tumor marker buried in the vicinity of a tumor...reference number 17 designates a tumor marker buried into a tumor within a patient's body...X-ray irradiated from the X-ray tube A passes through a portion near the tumor marker buried in the vicinity of the tumor within the body of the patient on the CFRP medical treatment base...the X-ray then forms a fluoroscopic image A on a tube face of the image intensifier." (see FIGs. 1-4; Abstract; col. 6, lines 58-59; col. 7, lines 54-59).

Thus, instead of performing non-invasive imaging as recited, Kunieda in direct contrast discloses an imaging method that solely relies on an invasive device (marker buried in the tumor vicinity) to direct irradiation of the tumor. Therefore, it is clear that Kunieda does not disclose and strongly teaches away from the recited feature making the claimed invention patentably distinct and non-obvious from this cited reference.

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached page is captioned "**VERSIONS WITH MARKINGS TO SHOW CHANGES MADE.**"

Conclusion

In view of the amendments and remarks submitted above, it is respectfully submitted that all of the remaining claims are allowable and a Notice of Allowance is earnestly solicited.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayments to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§1.16 or 1.17; particularly, extension of time fees.

The Examiner is invited to contact the undersigned at (703) 205-8000 to discuss the application.

Respectfully submitted,

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Attachment: Version with Markings to Show Changes Made



Application No. 09/964,481

VERSIONS WITH MARKINGS TO SHOW CHANGES MADE

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In the Claims:

The claims have been amended as follows:

1... (Amended) A radiation system comprising:

irradiation target positioning means for placing an object having an irradiation target to be subjected to irradiation;

irradiation target imaging means for non-invasively taking images of an irradiation target region including the irradiation target;

irradiation means for administering radiation to the irradiation target region according to prescribed irradiation conditions;

position and direction measuring means for measuring positions and directions of said irradiation target positioning means, said irradiation target imaging means and said irradiation means, and for computing relative positions and directions between them;

irradiation condition correcting means for obtaining position and direction of the irradiation target region in the images using computation results of said position and direction measuring means and compared results obtained by comparing the irradiation target regions in the images successively taken by said irradiation target imaging means, and for correcting the

- irradiation conditions in which the obtained position and direction is reflected; and

control means for controlling the radiation to the irradiation target region in response to the irradiation conditions obtained as a result of the correction by said irradiation condition correcting means.

5. (Amended) An irradiation target movement monitoring method of an irradiation system including irradiation target positioning means for placing an object having an irradiation target to be subjected to irradiation, irradiation target imaging means for taking images of an irradiation target region including the irradiation target, and irradiation means for administering radiation to the irradiation target region according to prescribed irradiation conditions, said irradiation target movement monitoring method comprising:

an image acquisition step of successively and non-invasively taking images of the irradiation target region by said irradiation target imaging means;

a position and direction measuring step of measuring positions and directions of said irradiation target positioning means, said irradiation target imaging means and said irradiation means, and of computing relative positions and directions between them; and

an irradiation target monitoring step of obtaining positions and directions of the irradiation target regions in the images using computation results obtained by said position and direction measuring means and compared results obtained by comparing the irradiation target regions in the images successively taken in the image acquisition step.

7. (Amended) A irradiation target position recognizing method of an irradiation system including irradiation target positioning means for placing an object having an irradiation target to be subjected to irradiation, irradiation target imaging means for taking images of an irradiation target region including the irradiation target, and irradiation means for administering radiation to the irradiation target region according to prescribed irradiation conditions, said irradiation target movement monitoring method comprising:

an image acquisition step of successively and non-invasively taking images of the irradiation target region by said irradiation target imaging means;

a position and direction measuring step of measuring positions and directions of said irradiation target positioning means, said irradiation target imaging means and said irradiation means, and of computing relative positions and directions between them; and

a target position recognizing step of obtaining positions and directions of the irradiation target regions in the images using computation results obtained by said position and direction measuring means and compared results obtained by comparing the irradiation target regions in the images successively taken in the image acquisition step, and of correcting the irradiation conditions by reflecting the positions and directions in the images.

8. (Amended) The irradiation target position recognizing method of an irradiation system according to claim 7, wherein the target position recognizing step obtains the positions and directions of the irradiation target regions in the images using computation results obtained in the position and direction measuring step and compared results obtained by comparing the irradiation target regions in the images successively taken by said irradiation target imaging means of [the] same modality.

Claims 9-12 have been added as follows:

11. (New) A method of radiating, comprising:
positioning an object including an irradiation target;
generating images non-invasively of an irradiation target
region including said irradiation target;
measuring position and direction of said irradiation target

based on said generated images using a coordinate system
including coordinate positions of said positioning device, said
irradiation device, and said at least one measuring device; and
determining a current position and direction of said
irradiation target based on comparing successive generated images
input from said measuring device using a predetermined algorithm;
and
irradiating said irradiation target based on said current
position and direction of the irradiation target.

12. (New) The method of claim 11, wherein said generating
includes generating said images in at least two different forms.